FORM PTO-1390 (REV 11-98) — U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE

TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371

ATTORNEY'S DOCKET NUMBER: 5017-5179

U.S. APPLICATION NO. (If known, see 37 CFR 1.5): 09/600831

INTERNATIONAL APPLICATION NO	INTERNATIONAL FILING DATE	PRIORITY DATE CLAIMED
PCT/GB99/03966	Nov. 29, 1999	Jan. 29, 1999

TITLE OF INVENTION: TREATMENT METHOD

APPLICANT(S) FOR DO/EO/US: DAVEY, Terence James

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. [X] This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. [ ] This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. [X] This express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and PCT Articles 22 and 39(1).
4. [ ] A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date.
5. [X] A copy of the International Application as filed (35 U.S.C. 371(c)(2))
   a. [X] is transmitted herewith (required only if not transmitted by the International Bureau).
   b. [ ] has been transmitted by the International Bureau.
   c. [ ] is not required, as the application was filed in the United States Receiving Office (RO/US).
6. [ ] A translation of the International Application into English (35 U.S.C. 371(c)(2)).
7. [X] Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3))
   a. [ ] are transmitted herewith (required only if not transmitted by the International Bureau).
   b. [ ] have been transmitted by the International Bureau.
   c. [ ] have not been made; however, the time limit for making such amendments has NOT expired.
   d [X] have not been made and will not be made.
8. [ ] A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).
9. [X] An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).
10. [ ] A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).

Items 11. to 16. below concern document(s) or information included:

11. [ ] An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
12. [ ] An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
13. [X] A FIRST preliminary amendment.
    [ ] A SECOND or SUBSEQUENT preliminary amendment.
14. [ ] A substitute specification.
15. [ ] A change of power of attorney and/or address letter.
16. [X] Other items or information:

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   - b. [ ] have been transmitted by the International Bureau.
   - c. [ ] have not been made; however, the time limit for making such amendments has NOT expired.
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15. [ ] A change of power of attorney and/or address letter.
16. [X] Other items or information:

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICANT: Terence James Davey

ATTORNEY DOCKET NO.:

SERIAL NO.:

EXAMINER:

FILED:

GROUP NO.:

PATENT NO.:

ISSUED:

ENTITLED: TREATMENT METHOD

VERIFIED STATEMENT AS SMALL ENTITY

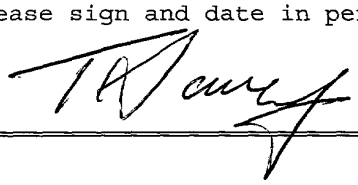
Honorable Commissioner of Patents and Trademarks
Washington, D.C. 20231

Sir:

The below-signing independent inventor has not assigned, granted, conveyed or licensed, and is under no obligation under contract or law to assign, grant, convey or license any rights in the invention to any person who could not likewise be classified as an independent inventor under 37 CFR 1.9(c) if that person had made the invention, or to any concern which would not qualify as a small business concern under 37 CFR 1.9(d) or a nonprofit organization under 37 CFR 1.9(e).

The undersigned acknowledges the duty to file, in this application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate (37 CFR 1.28(b)).

The below-signing individual hereby declares that all statements made herein of his own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application, any patent issuing thereon, or any patent to which this verified statement is directed.

Name of Individual Inventor: Terence James Davey	
Address: Journey's End, Marsh Lane Felixstowe, Suffolk, IP11 9RR Great Britain	
Signature: (Please sign and date in permanent ink.) X 	**Date signed:** X 6 July 2000

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF EXPRESS MAILING UNDER 37 C.F.R. § 1.10

I hereby certify that this correspondence and the documents referred to as enclosed therein are being deposited with the United States Postal Service on July 21, 2000 in an envelope as 'Express Mail Post Office To Addressee' Mailing Label Number EL470435827US addressed to: BOX PATENT APPLICATION, Assistant Commissioner for Patents, Washington, D.C. 20231.

Cathy Marino
Type or Print Name

Cathy Marino
Signature

In re application of: DAVEY, Terence James :
National Stage Filing of: PCT/GB99/03966 :
Filed: July 21, 2000 :
For: TREATMENT METHOD :
:

BOX PATENT APPLICATION
Assistant Commissioner for Patents
Washington, D.C. 20231

PRELIMINARY AMENDMENT

This is filed as a Preliminary Amendment concurrently with the above-referenced national stage filing of PCT/GB99/03966 to eliminate multiple dependent claims. It is respectfully requested that the amendments to the claims as described below be entered into the case and that the amended claims be examined on the merits.

In the Claims

In Claim 3, please delete the phrase "or Claim 2";

In Claim 4, please replace "any preceding claim" with --Claim 1--;

In Claim 5, please replace "any preceding claim" with --Claim 1--;

In Claim 6, please replace "any preceding claim" with --Claim 1--;

In Claim 7, please replace "any preceding claim" with --Claim 1--;

In Claim 8, please replace "any preceding claim" with --Claim 1--;

In Claim 13, please delete the phrase "or Claim 12";

In Claim 14, please replace "any one of Claims 11 to 13" with --Claim 11--;

In Claim 15, please replace "any one of Claims 11 to 14" with --Claim 11--;

In Claim 16, please replace "any one of Claims 11 to 15" with --Claim 11--;

Please renumber second original Claim 16 as Claim 17.

Please cancel original Claim 17 and Claim 18.

Remarks

Claims 3 - 8, 14 - 16, as filed in the International Application No. PCT/GB99/03966, are amended to eliminate multiple dependencies. The second original Claim 16 has been renumbered as Claim 17 to correct a typographical error in the claims as filed in the International Application. The omnibus claims, original Claim 17 and Claim 18, have been cancelled. It is respectfully requested that the amendments to the claims that are described above be entered into the case and that the claims be examined on the merits.

Respectfully submitted,

Kenneth Solomon
Reg. No. 31,427
Howell & Haferkamp, L.C.
7733 Forsyth Boulevard, Suite 1400
St. Louis, Missouri 63105
(314) 727-5188

July 21, 2000

Treatment Method

This invention relates to a method of and apparatus for treating products which are made of materials which are applied to a surface (which may be a mould surface which is subsequently removed) in a liquid form and thereafter have to dry or cure before the product is ready for use. Such materials will usually have a heterogenous structure. Examples of such products are those made from fibre reinforced plastics and plastered building walls, but the invention can have much wider application.

The invention is particularly suited for treating glass fibre boat hulls, but is not limited to this particular application. For convenience, the invention will largely be described with reference to its application to boat hulls but this is not to be taken as limiting the application of the invention, and those skilled in the art will be able to adapt the teaching here for use in connection with other products or structures.

Fibre reinforced plastics (FRP) boat hulls conventionally have a smooth outer gelcoat layer and a structural layer made up of fibres (usually glass fibres) embedded in a resin (most usually polyester resin). In some cases a foam or timber core is encapsulated between two reinforced fibre layers. The gelcoat and resin are initially liquids which are mixed with a hardener (catalyst) and applied within a mould in liquid state. After application, the liquids cure to the solid state.

After prolonged exposure in a marine environment, a number of boat hulls are found to suffer blistering which appears on the outer gelcoat surface. It appears that this is caused by a build up of fluid between the gelcoat layer

and the fibre/resin layer. The damage can result from one or more of the following: water penetration; degradation reactions resulting from water penetration; deterioration resulting from faulty manufacture; deterioration resulting from faulty materials used in the moulding process; deterioration resulting from failed bonding or de-lamination of foam or timber cores; de-lamination of the moulding. The symptoms of such damage are often attributed to "osmosis" but there is some doubt as to whether any or all of this damage is actually caused by an osmotic reaction.

Conventional treatment is to remove the affected gelcoat to expose the underlying fibre/resin lay-up, to thoroughly dry the exposed fibre/resin lay-up and then when drying is complete to reinstate the gelcoat, possibly with the addition of different resins to provide a better moisture barrier.

This treatment is sometimes, but by no means always, successful. It does however take a considerable amount of time because the resin/fibre lay-up can only be dried slowly, usually by allowing it to stand in the open.

According to the present invention, there is provided a method of treating a product moulded from fibre reinforced plastics, wherein the edges of a sheet of impermeable sheet material are secured to a surface of the product to be treated to enclose a space between the surface and the sheet, heating is applied within the space, and the gaseous contents of the space are continuously extracted while the sheet is held spaced from the surface to allow gas and vapour to be extracted from any area of the surface beneath the sheet.

The heating is preferably applied from a heat source within the space, but may also be applied from an external heat source, provided there is a thermally conducting path into the space, eg through a thermally conductive impermeable sheet material. In any case, some heat loss through the sheet material is desirable as this helps to maintain an even heat distribution within the space.

Preferably the sheet material has an area of up to 1 m^2, and can be of any convenient shape. The material is preferably secured to a part only of the product surface, and the entire product surface is preferably treated in a batch-wise manner by treating all the parts of the surface sequentially, or by securing a plurality of sheets simultaneously to different parts of the surface. Using a piece or pieces of sheet material of this size allows a boat hull to be treated section-by-section

The method will generally be carried out after the affected gelcoat, and any physically damaged material has been removed from the surface.

To maintain the space between the sheet and the surface, a permeable, substantially non-compressible spacer layer is preferably positioned between the sheet and the surface.

Extraction of the gaseous contents to form a vacuum (this term includes a partial vacuum) behind the sheet will pull the sheet against the spacer layer and (around the sheet edges) against the surface of the product to be treated to enclose a space adjacent the surface. It may be useful to initially secure the sheet to the surface by adhesive mastic or tape around the edges of the sheet to hold the sheet in place until the vacuum is applied. If there are any leaks around the edge of the sheet preventing the

maintenance of a suitable vacuum, adhesive tape or some other form of sealant may be applied around the edges.

The edges of the sheet may be of a soft, impermeable material which will be drawn against the surface when a vacuum is applied to form a seal without the need for any additional tape or sealant, or may have such a material sealed to the sheet edges.

A vacuum pump can be connected to the space to provide the extraction facility.

Tests have shown that the damage to the hull or other product does not only result from water penetration through the gelcoat, but also from unreacted chemicals in the gelcoat and in the fibre/resin layers. In some cases the resin is not completely cured at the time of manufacture, leading to the presence of reactive, but unreacted, chemicals in the structure.

By heating the laminate from the surface at the same time as drawing off any vapour or moisture from the surface, it is possible to ensure that any unreacted chemicals complete their reaction so that they become stable, at the same time as producing the necessary drying of the moulding. Once the drying is completed in this way, the removed gelcoat can be replaced with fresh gelcoat and the hull can be finished to complete the repair.

It is preferred to produce a vacuum in the space to a level of about 2 - 5 mb Abs, before beginning to apply heat within the space.

It is preferred to heat the surface within the space to a temperature which is just below the temperature at which

the moulding will be damaged by excess heat. In the case of polyester resins, the surface may be heated to a temperature between 80°C and 90°C which is a temperature at which the surface will not be at risk from damage caused by the elevated temperature. The elevated temperature however is effective in producing post-cure of any unreacted chemicals in the laminate. Higher temperatures may be used when the damage/deterioration is severe.

By continuously applying a very low pressure (high vacuum) to the space, vapour or gas is drawn off as soon as it becomes free at the surface, and also any gaseous reaction products are drawn off so that reactions take place quickly and thoroughly.

The invention also provides apparatus for treating a product moulded from fibre reinforced plastics, the apparatus comprising an impermeable sheet, means for securing the sheet to a surface of the product to be treated to enclose a space between the surface and the sheet, means for holding the sheet spaced from the surface to allow gas and vapour to be extracted from any area of the surface beneath the sheet, heating means for applying heat within the space and means for continuously extracting the gaseous contents of the space.

The means for spacing the sheet from the surface ensures that a space is maintained between the sheet and the surface, even when vacuum is applied. The spacing means may also space the heating means from the surface.

The means for extracting the gaseous contents of the space is preferably a vacuum pump capable of working down to pressures of 5 to 2 mb Abs.

The heating means preferably includes a thermostat and a controller so that a constant temperature can be maintained within the space. The sheet may include thermal insulating material.

A treatment duration of about 1-2 hours may be sufficient to dry out an area of laminate about 0.5 m^2 .

The apparatus may include sheets of differing sizes and differing shapes, so that the method can be carried out on product areas of various shapes.

The invention will now be further described, by way of example, with reference to the accompanying drawings, in which:

Figure 1 shows a boat hull being treated by a method in accordance with the invention;

Figures 2, 3, 4 and 5 show impermeable sheets of various different shapes;

Figure 6 is a cross section through one form of apparatus in accordance with the invention;

Figure 7 is a cross section through a second form of apparatus in accordance with the invention; and

Figures 8a and 8b show details of an edge of the apparatus before and after application of vacuum.

Figure 1 shows a yacht hull 10 with a water line 12 and a keel 14. A damaged area of the hull is shown in dotted

lines at 16, and this area has been covered by an impervious sheet or mat 18 which is secured to the hull 10 all the way round by adhesive tape 20, or by a suitable mastic. Alternatively the sheet may have an edge of a material which will automatically form a seal when pulled against the surface by a vacuum. Thus the space between the hull and the sheet 18 is enclosed. A suitable material for the sheet is a silicone rubber.

Connected to the centre of the sheet 18 is an outlet 22 for a vacuum hose 24. Also connected to the sheet 18 is an electrical lead 26 which leads from a power supply 26b through a connection 26a to a heating element attached to the surface of the sheet 18 which will face the hull.

Figure 6 shows a cross section through the area covered by the sheet 18. A layer of permeable insulating material 30 (for example a non-woven permeable polyester blanket) is provided immediately underneath the sheet 18, and a heating element 32 is sandwiched between two heat resisting permeable layers 34, 36. The heating element 32 is connected to the electrical supply 26. In use, when suction is applied through the outlet 22, air and any other gaseous elements contained within the space beneath the sheet 18 will be sucked out. This will tend to pull the sheet 18 against the surface of the hull 10, but a spacing will still be maintained because of the presence of the permeable spacer 30, and because the heating element 32 itself is substantially incompressible and occupies space. As a result, the pump 38 will be able to draw off gas from the whole of the space beneath the sheet 18, and thus from all parts of the surface of the hull 10 which are exposed within the space.

Other parts of the hull can be treated at the same time by securing other sheets as described to the appropriate hull parts. One vacuum pump may serve to simultaneously evacuate several areas under treatment.

The heating element 32 is sandwiched between the layers 34 and 36, partly to protect the heating element itself and partly to avoid scorching the surface of the hull 10. However it is possible for the heating element to be in direct contact with the hull if the temperature of the heating element and the surface of the hull are compatible. The element 32 can be sewn to one or the other of the layers 34,36.

A thermostat 40 can be fitted in a position where it will be in contact with the hull surface 10 so that the hull temperature can be monitored.

The arrangement shown in Figure 6 provides a very flexible device which can follow complex hull contours. Figure 7 shows a somewhat less flexible alternative. In this alternative, instead of the permeable insulating spacer 30, a wire mesh spacer 42 is used, and in this case the spacer 42 lies against the hull surface and the heating element is fitted between the sheet 18 and the spacer. The wire mesh spacer 42 has flexibility, but less than that of the insulating sheet type spacer 30 of Figure 6.

As the hulls of boats are irregular shapes, and parts of the hull, for example close to the bow, may need to be treated, it may be useful to have sheets of different shapes.

Figure 2 shows a simple rectangular sheet 10b with rounded corners; Figure 3 a round sheet 10c; Figure 4 a triangular

sheet 10d and Figure 5 a long narrow sheet 10e. The sheet of Figure 5 can be used for example to treat areas of a hull between chines. The rounded corners of Figure 2 allow a single strip of mastic to be easily placed all the way around the edges of the sheet, thus avoiding air gaps. The other sheet shapes can also have rounded corners.

In use, a strip of adhesive mastic tape 20 (Figure 8a) is stuck to the edges of the sheet 18, and the sheet is secured to the damaged area of the hull (after removal of the damaged gelcoat) by this tape. A high vacuum is applied to the surface of the hull through the conforming flexible enclosure which has an underlying permeable spacer. The edges of the sheet are pulled down against the hull with the result that the tape 20 is compressed, as can be seen in Figure 8b. However the presence of the spacer 30, 42 ensures that there is always communication between the outlet 22 and all parts of the hull surface beneath the sheet. Heat is then slowly applied to raise the laminate to that temperature where the contaminants made volatile by the low pressure are drawn off.

The heater is equipped with a controller which maintains a steady temperature at which the moulding is likely to be completely cured or stabilised. The heat output is controlled to remain safely below the temperature at which the laminate would be damaged or affected by a serious loss of structural strength.

The temperature at which the laminate is maintained varies with the materials of the moulding. For example, a typical glass fibre reinforced polyester moulding would be maintained at a temperature between 82°C and 90°C.

After completion of treatment, the heater is switched off, the vacuum is released and the sheet is removed by peeling it away from the surface. The mastic tape 20 is removed and discarded. Before the sheet is applied to a new area of the surface, a fresh layer of tape is applied around the sheet edge.

The method and apparatus allows large mouldings to be effectively treated by means of moderately sized, easily handled enclosures. Although the technique has been particularly developed for use on boat hulls, it can also be used on other mouldings, for example fixed mouldings used in architecture, tanks or containments.

It has been found that glassfibre structures, treated in this way, experience some change in mechanical properties. It has surprisingly been found that treated structures have a greater stiffness in bending after treatment than before, while a small decrease in tensile strength has been noted. For boat hulls, stiffness in bending is important as this reduces flexing of the hull in a seaway.

The vacuum at which the system is effective depends upon the defects in the moulding. However the method is more efficient as the vacuum increases. Typical vacuum levels are close to 2.0 Mb absolute.

The combination of heat and vacuum, applied as described here will be sufficient to stabilise the deteriorating fibre/resin structure and allow restoration to its original condition. Thus, whether the problem is simply water penetration, or a more chemically complex problem, a solution can still be achieved.

Claims

1. A method of treating a product which is made of a material which has or materials which have been applied to a surface in a liquid form and thereafter have dried or cured to make the product ready for use, wherein the edges of a sheet of impermeable sheet material are secured to a surface of the product to be treated to enclose a space between the surface and the sheet, heating is applied within the space, and the gaseous contents of the space are continuously extracted while the sheet is held spaced from the surface to allow gas and vapour to be extracted from any area of the surface beneath the sheet.

2. A method as claimed in Claim 1, wherein the impermeable sheet material is secured to the surface by adhesive tape around the edges of the material, so that a space is provided between the impermeable sheet material and the surface.

3. A method as claimed in Claim 1 or Claim 2, wherein the impermeable sheet material has edges which are capable of forming an air tight seal when pulled against the surface by a vacuum.

4. A method as claimed in any preceding claim, wherein a vacuum pump is connected to the space to provide the extraction facility.

5. A method as claimed in any preceding claim, wherein a vacuum is produced in the space before beginning to apply heat within the space.

6. A method as claimed in any preceding claim, wherein a vacuum at a level of about 2 - 5 mb Abs is produced and maintained in the space.

7. A method as claimed in any preceding claim, wherein the product is a glassfibre moulding made with a polyester resin and the surface within the space is heated to a temperature of between 80°C and 90°C.

8. A method as claimed in any preceding claim, wherein the product is a glassfibre moulding with an outer gelcoat and wherein the sheet material is secured to the surface after affected gelcoat, and any physically damaged material has been removed from the surface.

9. A method as claimed in Claim 8, wherein the treatment is completed by replacing removed gelcoat with fresh gelcoat.

10. A method of treating a boat hull moulded from fibre reinforced plastics, wherein the edges of a sheet of impermeable sheet material are secured to a surface of the hull to be treated to enclose a space between the surface and the sheet, heating is applied within the space, and the gaseous contents of the space are continuously extracted while the sheet is held spaced from the surface to allow gas and vapour to be extracted from any area of the surface beneath the sheet.

11. Apparatus for treating a product made of a material which has or materials which have been applied to a surface in a liquid form and thereafter have dried or cured to make the product ready for use, the apparatus comprising an impermeable sheet, means for securing the sheet to a surface of the product to be treated to enclose

a space between the surface and the sheet, means for holding the sheet spaced from the surface to allow gas and vapour to be extracted from any area of the surface beneath the sheet, heating means for applying heat within the space and means for continuously extracting the gaseous contents of the space.

12. Apparatus as claimed in Claim 11, wherein the means for extracting the gaseous contents of the space is a vacuum pump capable of working down to pressures of 5 to 2 mb Abs.

13. Apparatus as claimed in Claim 11 or Claim 12, wherein the heating means includes a thermostat and a controller so that a constant temperature can be maintained within the space.

14. Apparatus as claimed in any one of Claims 11 to 13, wherein the sheet has thermal insulation properties.

15. Apparatus as claimed in any one of Claims 11 to 14, including sheets of differing sizes and differing shapes, so that the method can be carried out on product areas of various shapes.

16. Apparatus as claimed in any one of Claims 11 to 15, wherein the edges of the sheet are of a material which will form an air-tight seal against the surface when pulled against the surface by a vacuum.

17 ~~16~~. A method of treating a product moulded from fibre reinforced plastics, wherein impermeable sheet material is secured to a surface of the product to be treated to enclose a space between the surface and the layer, heating

is applied within the space, and the gaseous contents of the space are continuously extracted.

17. A method of treating a product moulded from fibre reinforced plastics, substantially as herein described with reference to the accompanying drawings

18. Apparatus for treating a product moulded from fibre reinforced plastics substantially as herein described with reference to the accompanying drawings

Abstract

Treating Products Moulded from Fibre Reinforced Plastics

To treat FRP moulded products, such as boat hulls, where the structure of the FRP laminate has been damaged, eg by water penetration, a layer of impermeable sheet material is first secured to a surface of the product to be treated to enclose a space between the surface and the layer. The contents of the space are continuously evacuated, for example by a vacuum pump, and then heating is applied within the space. A spacer is provided within the space to hold the sheet material away from the surface when vacuum is applied.

Figure 1

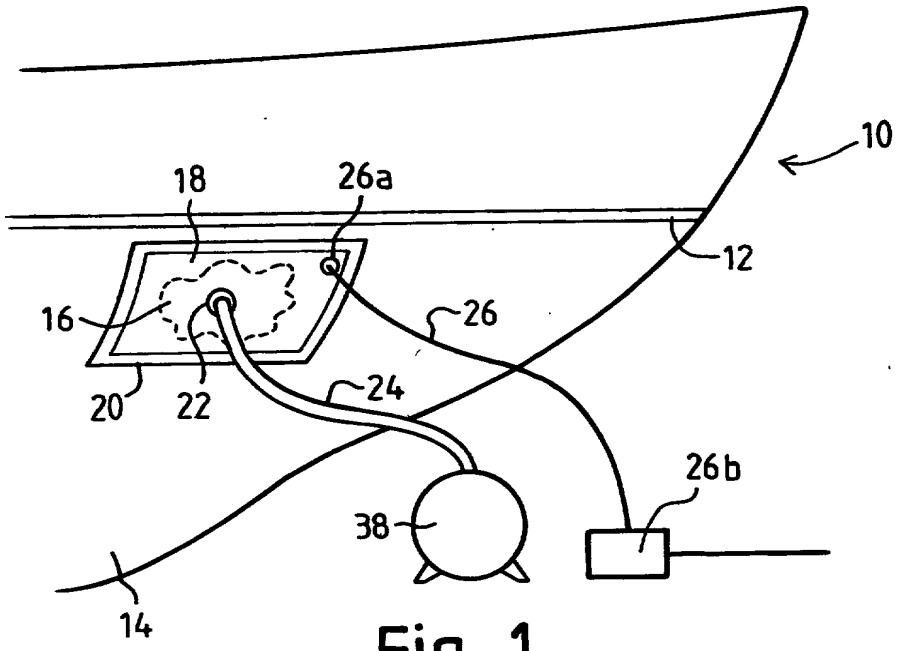


Fig. 1

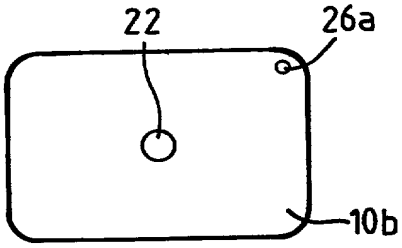


Fig. 2

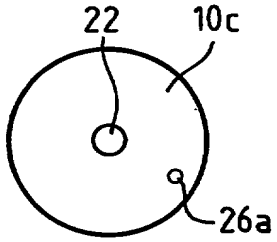


Fig. 3

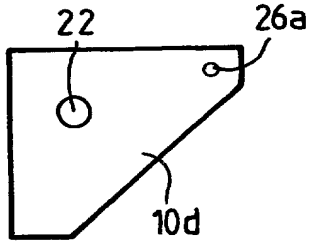


Fig. 4

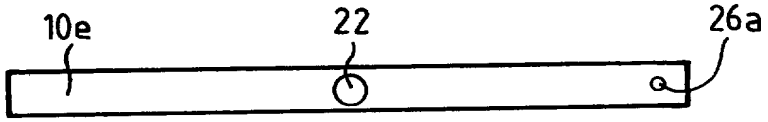


Fig. 5

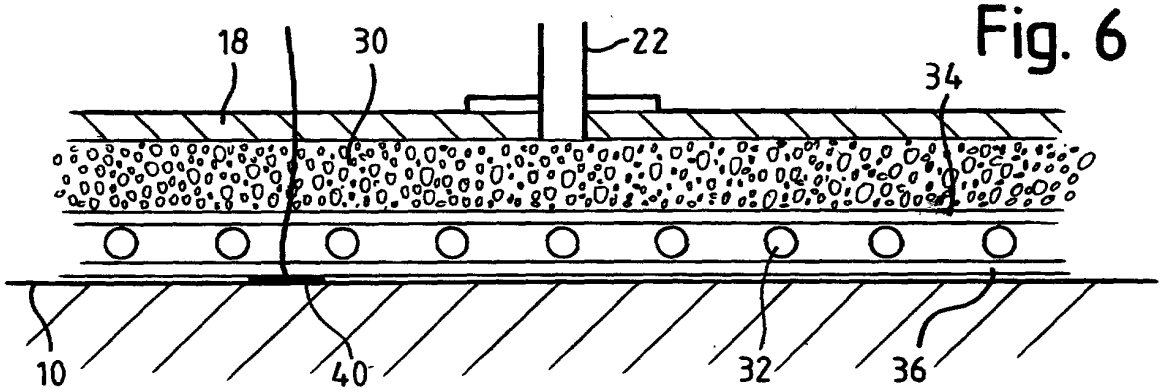


Fig. 6

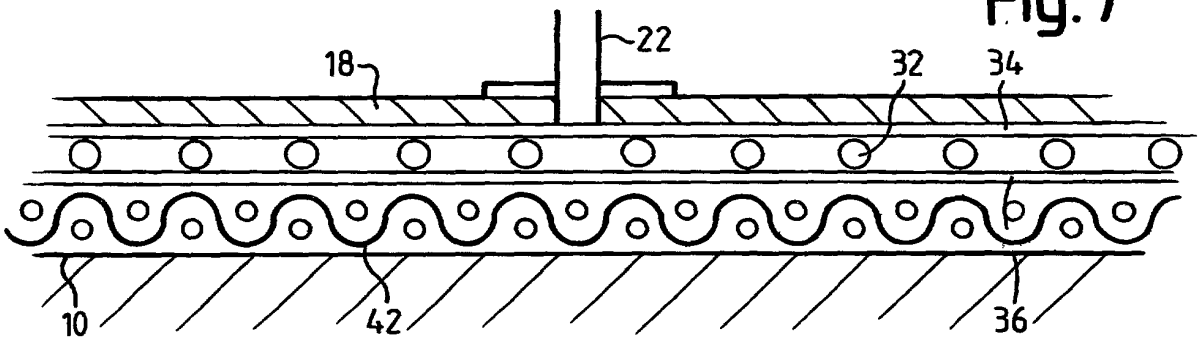


Fig. 7

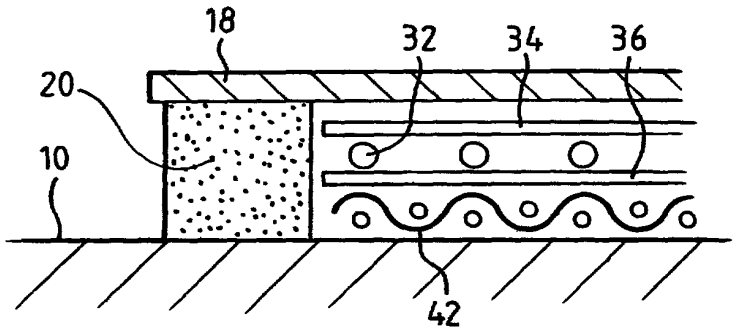


Fig. 8a

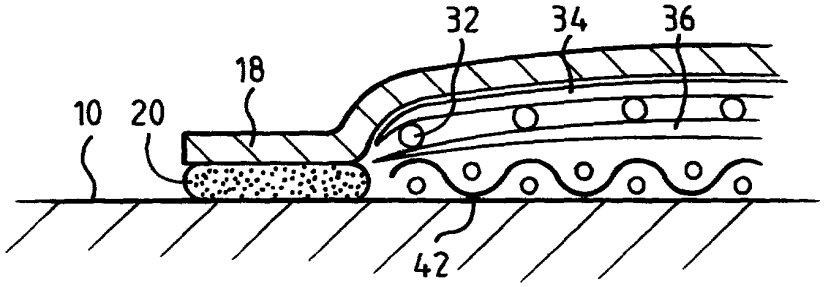


Fig. 8b

PATENT
Express EL470435827US
Attorney's Docket No. 5017-5179

COMBINED DECLARATION AND POWER OF ATTORNEY

(Original, Design, National Stage of PCT or CIP Application)

Inventor: Terence James Davey

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are stated below next to my name, I believe I am the original, first and sole inventor of the subject matter which is claimed and for which a patent is sought on the invention entitled: TREATMENT METHOD

the specification of which: (Complete (a), (b) or (c) for type of application)

REGULAR OR DESIGN APPLICATION

(a) ____ is attached hereto.

(b) ____ was filed on _ as Application Serial No. _ and was amended on _ (if applicable).

PCT FILED APPLICATION ENTERING NATIONAL STAGE

(c) __X__ was described and claimed in International Application No. PCT/GB99/03966 filed on 29 November 1999.

ACKNOWLEDGEMENT OF REVIEW OF PAPERS AND DUTY OF CANDOR

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations §1.56.

____ In compliance with this duty there is attached an information disclosure statement. 37 CFR 1.97.

PRIORITY CLAIM

I hereby claim foreign priority benefits under Title 35, United States Code, §119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed.

[Complete (d) or (e)]

(d) ____ no such applications have been filed.

(e) __X__ such applications have been filed as follows.

EARLIEST FOREIGN APPLICATION(S), IF ANY FILED WITHIN 12 MONTHS (6 MONTHS FOR DESIGN) PRIOR TO SAID APPLICATION

Country	Application No.	Date of filing (day, month, year)	Date of issue (day, month, year)	Priority Claimed
UK	9901860.8	29/01/1999		__X__ YES NO ___

POWER OF ATTORNEY

As a named inventor, I hereby appoint the following attorney and/or agent to prosecute this application and transact all business in the U.S. Patent and Trademark Office connected therewith, before all competent international authorities in connection with any international application, and before all foreign patent offices in connection with the national phase of any international application or any foreign application, and to appoint any associate attorneys in connection with any application, either domestic, international or foreign national. John M. Howell (25,261); Richard E. Haferkamp (29,072); Kenneth Solomon (31,427); Joseph M. Rolnicki (32,653); Joseph E. Walsh, Jr. (36,959); Alan H. Norman (32,285); Donald R. Holland (35,197); Bryan K. Wheelock (31,441); Charles E. Dunlap (35,124); Anthony G. Simon (40,813); Michael J. Thomas (39,857); Thomas A. Polcyn (41,256); Elie H. Gendloff (P44,704)

Send Correspondence To
Kenneth Solomon
HOWELL & HAFERKAMP, L.C.
7733 Forsyth Boulevard
Suite 1400
St. Louis, Missouri 63105

Direct Telephone Calls To

Kenneth Solomon
(314) 727-5188

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

1 — 00

Full name of sole or first inventor Terence James Davey

Inventor's signature T J Davey

Date 6 July 2000 Country of Citizenship Great Britain GBN

Residence Journey's End, Marsh Lane, Felixstowe, ~~Suffolk~~, IP11 9RR, Great Britain

Post Office Address Journey's End, Marsh Lane, Felixstowe, Suffolk, IP11 9RR, Great Britain